IS 10738-3-1 (1991): Flanges for Waveguides, Part 3: Flanges for Flat Rectangular Waveguides, Section 1: General [LITD 6: Wires, Cables, Waveguides and Accessories]

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IS 10738 (Part 3/Sec 1) : 1991

भारतीय मानक

(Reaffirmed 2002)

तरंग पथकों के लिए फ्लैंजों की विशिष्टि

भाग 3 सपाट आयताकार तरंग पथकों के फ्लैंज

अनुभाग 1 सामान्य

Indian Standard

SPECIFICATION FOR FLANGES FOR WAVEGUIDES

PART 3 FLANGES FOR FLAT RECTANGULAR WAVEGUIDES

Section 1 General

UDC 621·643·412 : 621·372·822

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

June 1991

Price Group 1

FOREWORD

This Indian Standard (Part 3/Sec 1) was adopted by the Bureau of Indian Standards, after the draft finalized by the Microwave Components and Accessories Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

This standard shall be read in conjunction with IS 10738 (Part 1) : 1983 'Flanges for waveguides : Part 1 General requirements and tests'.

Different types of waveguide flanges are being covered in a series of standards consisting of the following individual parts of IS 10738:

Part 1 General requirements and tests

Part 2 Flanges for ordinary rectangular waveguides

Part 3 Flanges for flat rectangular waveguides

Part 4 Flanges for circular waveguides

Part 5 Flanges for medium flat rectangular waveguides

Part 6 Flanges for square waveguides

Part 3 of IS 10738 series is being issued in 2 sections as follows:

Section 1 General

Section 2 Flange Type G

While preparing this standard assistance has been derived from IEC Pub 154-3 (1974) 'Flanges for waveguides : Part 3 Relevant specification for flanges for flat rectangular waveguides' issued by the International Electrotechnical Commission.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATION FOR FLANGES FOR WAVEGUIDES

PART 4 FLANGES FOR FLAT RECTANGULAR WAVEGUIDES

Section 1 General

1 SCOPE

This Indian Standard (Part 3/Sec 1) specifies general requirements and tests for the flanges for flat rectangular waveguides.

2 REFERENCES

The following standards have been referred to in this standard:

IS No.	*Title*
4493 (Part 4) : 1982	Hollow metallic waveguides : Part 4 Flat rigidrectangular waveguides
10738 (Part 1) : 1983	Flanges for waveguides : Part 1 General requirements and tests

3 CLIMATIC CATEGORIES

Provisions of 3 of IS 10738 (Part 1) : 1983 shall apply.

4 MATERIALS, CONSTRUCTION AND WORKMANSHIP

Provisions of 4 of IS 10738 (Part 1) : 1983 shall apply.

5 DESIGNATION OF FLANGES FOR WAVEGUIDES

Provisions of 5 of IS 10738 (Part 1) : 1983 shall apply.

6 MARKING

Provisions of 6 of IS 10738 (Part 1) : 1983 shall apply.

7 PACKAGING

Provisions of 7 of IS 10738 (Part 1) : 1983 shall apply.

8 INFORMATION ON REFLECTION

The information on reflection at the flange joints is given in Appendix A.

9 TESTS

9.1 Provisions of 8 of IS 10738 (Part 1) : 1983 shall be applicable except for/in addition to the following.

9.1.1 *Shank Diameter of Both Used for Alignment*

The basic values and deviations thereon are specified in Sec 2 of this part.

9.1.2 *Relation Between Shank and Locating Hole Diameter*

For each individual flange the proper mating of two flanges is ensured by specifying:

a) the location and nominal diameter of the holes and the tolerances thereon, and

b) the nominal diameter of the shanks of coupling bolts with the appropriate fit.

The recommended fits are given in Sec 2 of this part.

NOTE — When electrical requirements make it necessary, the hole position tolerance may be reduced and the hole diameter fit improved accordingly.

9.1.3 *Flatness of Contact Area*

The flatness of contact area shall be better than the values given in the following table:

Range of Sizes	*Requirements* (mm)
F22-F32	0·05
F40 and smaller dimensions	0·02

9.1.4 *Perpendicularity of the Contact Area*

The perpendicularity of the contact area of the flange to the axis of the waveguide shall be 90 $\pm$ 0·25 degrees.

9.1.5 *Additional Requirements*

9.1.5.1 The drawings shown in Sec 2 of IS 10738 series are for mounted flanges. In the individual drawings, one method is shown by way of example for the mounting of flanges to the waveguide. This, however, does not exclude another method of mounting if the actual dimensions permit.

NOTE — For pre-drilled flanges the positioning of the holes should be based on the theoretical symmetry lines of the flange aperture.

9.1.5.2 When ordering unmounted flanges, an allowance should be made on certain of the specified dimensions to cover the effects of possible machinery after mounting.

ANNEX A

(*Clause* 8)

INFORMATION ON REFLECTION

Information on Reflection

The reflections at the flange joint are of three kinds:

a) those caused by the allowed deviations on the internal dimensions of the waveguides;

b) those caused by lateral displacements of the two flange assemblies; and

c) those caused by the checks (in the following, these reflections are not taken into account).

When the deviations on the dimensions of the waveguides [according to IS 4493 (Part 4) : 1982] and of the assemblies (according to this standard) sum up to cause maximum lateral displacement and maximum changes of the waveguide internal dimensions, the theoretical maximum reflection may be calculated from:

$$\text{Reflection loss} = 10 \log_{10} \frac{1}{\left[\frac{\lambda g^2 \triangle a}{4a^3} + \frac{\triangle b}{b}\right]^2 + \left[\frac{4{\cdot}934\,8\,\lambda g(\triangle a'^2)}{a^3} - \frac{7{\cdot}895\,7(\triangle b')^2}{\lambda g b}\right]^2} \; dB$$

where

a = basic inside width of the waveguide,

b = basic inside height of the waveguide,

λg = waveguide wavelength,

$\triangle a$ and $\triangle b$ are the waveguide internal deviations, and

$\triangle a'$ and $\triangle b'$ are displacements of the waveguide axes.

NOTE 1 — The first term within brackets represents the worst case reflection component at a flange joint caused by changes of the waveguide internal dimensions.

NOTE 2 — The second term within brackets represents the reflection component at a flange joint caused by the displacement of the flange assemblies.

At the higher end of the waveguide frequency band, the reflection component is maximum when the displacement exists in the short wall direction only.

At the lower end of the waveguide frequency band, the reflection component is maximum when the displacement exists in the long wall direction only.

NOTE 3 — The maximum reflection at the higher end of the waveguide frequency band is smaller than the maximum reflection at the lower end of the band for the same magnitude of displacement.

NOTE 4 — The 'reflection loss' in decibels is given as a positive quantity.

The worst 'reflection loss' in decibels is given as a (positive) decibels for waveguides F22 to F84.

Frequency	Waveguides (dB)							
	F22	F26	F32	F40	F48	F58	F70	F84
F = 1·25 fc	39·7	39·6	39·6	39·7	39·5	39·7	40·6	42·1
F = 1·50 fc	40·2	40·0	39·8	40·2	40·0	40·1	40·9	42·3
f = 1·90 fc	40·0	39·6	39·1	40·1	39·6	39·6	40·3	41·4

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